527 CMR 24.00: FIRE WARNING SYSTEMS INSTALLED IN BUILDINGS WITHIN THE COMMONWEALTH OF MASSACHUSETTS

Section

24.01: Purpose

The purpose of 527 CMR 24.00 is to provide basic minimum standards for the installation, operation, and maintenance of automatic smoke and heat detectors that are required in certain buildings pursuant to M.G.L. c. 22, § 14; and M.G.L. c. 148, §§ 10 and 28. The installation of these devices is intended primarily for the protection of life by indicating abnormal conditions and secondarily to summon assistance.

24.02: Scope

(1) 527 CMR 24.00 covers minimum design, performance, location, mounting, testing, and maintenance requirements of automatic smoke/ heat detectors and systems for protection of the occupants of certain buildings in accordance with the stated purposes. Said design, installation, testing and maintenance of said system shall be in compliance with NFPA 72, National Fire Alarm Code 1996 edition.

(2) Nothing in 527 CMR 24.00 is intended to prevent the use of new methods or devices, provided, however, that sufficient data (technical and other) are submitted to the enforcement authority to demonstrate that the new method or device is equivalent (in quality, effectiveness, durability, and safety) to that prescribed by 527 CMR 24.00.

(3) 527 CMR 24.00 shall not apply to those installations for which the head of the local fire department has given installation approval prior to the effective date of 527 CMR 24.00.

(4) The design, installation, and performance of required fire warning systems, pursuant to M.G.L. c. 148, § 26C, shall be in accordance with NFPA 72.

(5) When any provision of 527 CMR 24.00 is in conflict with any provision of NFPA 72 on the effective date of 527 CMR 24.00 or hereafter adopted, the provision which establishes the higher standard for the promotion and protection of the safety and welfare of the public shall prevail. The head of the fire department shall enforce 527 CMR 24.00.

24.03: Definitions

The following terms shall have the following meanings for the purpose of 527 CMR 24.00 and M.G.L. c. 22, § 14; and M.G.L. c. 148, §§ 10 and 28.

Apartment Houses. Buildings containing six or more dwelling units with independent cooking and bathroom facilities, whether designated as apartment house, tenement, garden apartment, condominium, or by any other name.

Approved. This term means equipment or materials listed or labeled or included on a list published by an organization acceptable to the Board of Fire Prevention Regulations or the State Fire Marshal, which organization is concerned with product evaluation, maintains periodic inspection or production of listed equipment or materials, and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

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Automatic Heat Detector. A device which automatically detects abnormally high temperature or rate of temperature rise and automatically initiates an audible alarm that can be effectively heard above the maximum noise level obtained under normal conditions of occupancy.

Automatic Smoke Detector. A device which automatically detects the visible or invisible particles of combustion and automatically initiates an audible alarm that can be effectively heard above the maximum noise level obtained under normal conditions of occupancy.

Boarding or Lodging Houses. Buildings in which separate sleeping rooms are rented providing sleeping accommodations for persons on either a transient or a permanent basis, with or without meals, but which may have separate cooking facilities for individual occupants.

Dormitories. Buildings or spaces in buildings where group sleeping accommodations are provided for persons not members of the same family group in one room or in a series of closely associated rooms under joint occupancy and single management, as in college dormitories, fraternity houses, military barracks, and ski lodges, with or without meals, but without individual cooking facilities.

Dwelling Unit. A single living unit consisting of one or more rooms and providing complete independent living facilities for one or more persons including permanent provisions for living, sleeping, cooking, and sanitation.

Hotels and Family Hotels. Buildings or groups of buildings under the same management in which there are sleeping accommodations for hire, primarily used by transients who are lodged with or without meals, whether designated as a hotel, inn, club, motel, or by any other name. So-called apartment hotels shall be classified as hotels because they are potentially subject to transient occupancy similar to that of hotels.

24.04: Approval of Design

(1) Complete information in accordance with the requirements in 527 CMR 24.05, 24.06, and 24.07 regarding the fire protection devices, equipment, and systems shall be submitted to the head of the fire department for approval prior to beginning any installation of the detectors.

(2) The information submitted shall include specifications and floor plans showing the location of all devices and controls.

24.05: Power Supply Sources

(1) General.

(a) All power supplies shall be sufficient to operate the alarm signal(s) for at least four continuous minutes.

(b) For electrically powered devices, an AC primary power source shall be utilized. However, in existing buildings where the head of the fire department finds that circumstances prohibit the use of wiring, the head of the fire department may permit a monitorized battery as the primary source of power inside a dwelling unit. The circumstances that may be considered include, but are not limited to, the structural design of the building, the economic cost to the owner, the likelihood of fire at the locus, and the type of material used in the structure of the building.

(2) Primary Power Supply (AC).

(a) An AC primary source of electric power shall be a dependable commercial light and power supply source. A visible "power on" indicator shall be provided.

(b) All detector systems designed for operation on a voltage in excess of 30 volts shall be installed in accordance with the latest Massachusetts Electrical Code, 527 CMR 12.00. (c) Cord-connected installations shall not be allowed.

(d) Fire warning equipment shall not be subject to loss of power by a wall switch.

(e) Neither loss nor restoration of primary power shall cause an alarm signal.

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(3) Primary Power Supply (Monitored Battery). Where allowed and approved by the head of the fire department, fire warning equipment may be powered by a battery provided that the battery is monitored to assure that the following conditions are met:

(a) All power requirements are met for at least one year's life, including weekly testing. (b) A distinctive audible trouble signal is given before the battery is incapable of operating (from aging, terminal corrosion, etc.) the device for alarm purposes.

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(c) For a unit employing a lock in alarm feature, automatic transfer is provided from alarm to a trouble condition.
(d) The unit is capable of producing an alarm signal for at least four minutes at the battery voltage at which a trouble signal is normally obtained followed by seven days of trouble signal operation.
(e) The audible trouble signal is produced at least once every minute for seven consecutive days.
(f) The monitored batteries meeting these specifications are clearly identified on the unit near the battery compartment.

24.06: Equipment Performance

(1) Smoke Detectors.
(a) Each smoke detector shall detect abnormal quantities of smoke that may occur in a building and shall properly operate in the normal environmental conditions of said building.
(b) All smoke detectors used pursuant to the provisions of 527 CMR 24.00 shall be listed to UL 268.

(2) Heat Detectors
(a) Each heat detector shall detect abnormally high temperature or rate-of-temperature rise, and all detectors shall be listed or approved for not less than 50 ft. (15 m) spacing.
(b) Fixed temperature detectors shall have a temperature rating at least 25°F (14°C) above the normal ambient and shall not exceed 50°F (28°C) higher than the maximum anticipated ambient temperature in the room or space where installed.

(3) Alarm Audibility and Responsibility. All alarm sounding devices shall have a minimum rating of 85 dBa (adjusted decibels) at ten feet (3m).

(4) Control Equipment.
(a) The control equipment shall be automatically restored on restoration of electrical power.

(b) The control equipment shall be of a type that "locks in" on an alarm condition. Smoke detection circuits need not lock in.
(c) If a reset switch is provided, it shall be a self-restoring type.
(d) Any alarm silencing switch or an audible trouble silencing switch shall not be provided unless its silenced position is indicated by a readily apparent signal.
(e) Each electrical fire warning system and single station smoke detector shall have an integral test means to permit the owner to check the system and sensitivity.

(5) Detector Circuits.
(a) A detector circuit will be required where a break in the wiring will not cause an alarm signal, but will cause an audible trouble signal, using either a closed loop detector circuit or normally open contact detectors with end-of-line resistor or equivalent. Exception: A single open or a single ground fault in any wiring among multiple station interconnected detectors or any wiring extending to a remote signaling device is not required to be indicated by a trouble signal if the fault does not prevent operation of any of the interconnected units as a single station detector.

(6) Combination System.
(a) When common wiring is employed for a combination system, the equipment for other than the fire warning signaling system shall be connected to the common wiring of the system so that short circuits, open circuits, grounds, or any fault in this equipment or interconnection between this equipment and the fire warning system wiring shall not interfere with either the supervision of the fire warning system or prevent alarm or trouble signal operation.
(b) In a fire/burglar system, the operation shall be as follows:
1. A fire alarm shall take precedence or be clearly recognizable over any other signal even when the nonfire alarm signal is initiated first.

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2. Distinctive alarm signals shall be obtained between fire alarm and other functions, such as burglar alarm. The use of a common sounding appliance for fire and burglar alarm is acceptable if distinctive signals are obtained. A steady, continuous sound for one alarm function is acceptable.

24.07: Installation

(1) General.

(a) All equipment shall be installed in a workmanlike manner.

(b) All devices shall be so located and mounted that accidental operation will not be caused by jarring or vibration.

(c) Installed fire warning equipment shall be mounted so as to be supported independently of its attachment to wires.

(d) All installation wiring shall be in accordance with the requirements of the manufacturer of the equipment connected to the said wiring.

(2) Detector Location and Spacing.

(a) Smoke Detectors.

1. All automatic smoke and heat detectors located in lobbies, common corridors, hallways and stairways of buildings subject to 527 CMR 24.00 shall be interconnected thereby producing a simultaneous series of audible alarms throughout the entire building.

2. All lobbies, common corridors, hallways and exitway access discharge routes shall be provided with automatic smoke detectors with no more than a 30' spacing between detectors.

3. In buildings having more than one level serviced by open stairways, a detector shall be located on the ceiling on the uppermost level of the stairwell, and a detector shall be located on the ceiling of the lowest level.

4. A smoke detector installed in a stairwell shall be so located as to assure that smoke rising in the stairwell cannot be prevented from reaching the detector by an intervening door or obstruction.

5. A smoke detector installed to detect a fire in the basement shall be located in close proximity to the stairwell leading to the floor above.

6. One approved smoke detector shall be installed to protect each separate sleeping area. Bedrooms (or sleeping rooms) separated by other use areas such as kitchens or living rooms (but not bathrooms) shall, for the purposes of 527 CMR 24.00, be considered as separate sleeping areas.

7. A smoke detector installed to protect a sleeping area shall be located outside the bedrooms but in the immediate vicinity of sleeping area.

8. The smoke detector installed on a story without a separate sleeping area shall be located in close proximity to the stairway leading to the floor above.

9. The head of the fire department may require that an automatic single station detector be installed within the sleeping area of dormitory bedrooms.

10. Smoke detectors shall be located on or near the ceiling.

11. Smoke detectors in rooms with ceiling slopes greater than one foot rise per eight feet horizontally shall be located at the high side of the room.

12. A smoke detector shall not be required to be located in or within six feet of a kitchen, cooking area, or garage. 527 CMR 24.07 does not, however, preclude installation in these areas.

13. In circumstances where smoke detectors cannot operate (i.e. open rear porches and stairways), the head of the fire department may require the installation and interconnection of heat detectors with the system type in use.

(b) Heat Detectors.

1. On smooth ceilings, heat detectors shall be installed within the strict limitations of their listed spacing.

2. For sloped ceilings having a rise greater than one ft. in eight ft. (one m in eight m) horizontally, the detector shall be located on or near the ceiling at or within three ft (0.9 m) of the peak. The spacing of additional detectors, if any, shall be based on a horizontal distance measurement, not on a measurement along the slope of the ceiling.

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3. Heat detectors shall be installed on or near the ceilings.

(3) Fire Warning Systems.

(a) Type I system shall consist of the following: A series of approved smoke detectors and heat detectors with an approved secondary source of power and annunciator at grade level, located pursuant to the approved design specifications. The system shall provide for automatic fire department notification approved by the head of the fire department.

(b) Type II system shall consist of the following: A series of approved smoke and heat detectors with an approved secondary source of power and annunciator at grade level, located pursuant to the approved design specifications.

(c) All buildings which contain 13 or more separate dwelling units shall be provided with a Type I system. The head of the fire department may waive the requirement of automatic fire department notification in circumstances considered in accordance with 527 CMR 24.05(1)(b).

(d) All buildings which contain six to 12 separate dwelling units shall be provided with a Type II system. If the said building contains three or more levels, manual pull stations shall be provided. The manual pull stations shall be located on the corridor side of and within six feet of each entrance to an exitway. Manual pull stations shall be connected to the building fire alarm system in conformance with NFPA 72. The head of the fire department may waive the requirement of manual pull stations and/or an annunciator in circumstances considered in accordance with 527 CMR 24.05(1)(b).

24.08: Maintenance and Testing

(1) General.

(a) Each automatic detector shall be continuously maintained in reliable operating condition at all times, and such periodic inspections and tests shall be made as are necessary to assure proper maintenance as specified.

(b) Detectors shall be under the supervision of a responsible person who shall cause proper tests to be made at specific intervals and have general charge of all alterations and additions.

(c) In any tests, all persons who would automatically receive an alarm shall be notified so that an unnecessary response shall not take place.

(d) After installation, a visual inspection of all detectors shall be made to insure that they are properly located.

(e) After installation, each detector shall be checked to insure that it is properly connected and powered in accordance with the manufacturer's recommendations.

(2) Initial Installation Tests.

(a) Heat Detectors.

1. A self-restorable spot-type detector shall be tested with a heat source, such as a hair drier or shielded heat lamp, until it responds. After each heat test, the detector shall reset itself.
2. Line or spot-type detectors of the nonrestorable type shall not be heat tested.
3. Detectors with a replaceable fusible alloy element shall be tested by:
   a. removing the fusible element to determine that the detector contacts operate properly, and then
   b. reinstalling the fusible element.

(b) Smoke Detectors.

1. To assure that each smoke detector is operative, it shall be tested, in place, in accordance with the manufacturer's instructions.
2. Instruments for checking the sensitivity of some detectors are available from the manufacturer. When using these, the manufacturer's recommended test instructions shall be followed.

(3) Periodic Tests.

(a) Detectors shall be tested as described in the following paragraphs. The method of test shall be as outlined in 527 CMR 24.08(2).

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(b) For nonrestorable spot-type detectors, after the 15th year, at least two detectors out of every hundred, or fraction thereof, shall be removed every five years and sent to a nationally recognized testing laboratory for tests. The detectors removed for this purpose shall be replaced with new detectors. If a failure occurs on any of the detectors removed, additional detectors shall be removed and tested as a further check on the installation until there is proven to exist either a general problem involving faulty detectors, or a localized problem involving only one or two defective detectors.

(c) For restorable spot-type heat detectors, at least one detector on each signal initiating circuit shall be tested semi-annually and different detectors shall be selected for each test.

(d) Line-type fixed-temperature detectors shall have their loop resistance measured and recorded in the control cabinet at least semi-annually.

(e) Smoke detectors shall be tested annually in accordance with the manufacturer's instructions.

(f) A permanent record showing all details of the test including the name of the inspector, type, number, location and the results of detectors tested on a specific date shall be kept by the building owner, and a copy shall be submitted to the head of the fire department.

(4) Cleaning and Maintenance. Ionization and photoelectric smoke detectors may require periodic cleaning to remove dust or dirt which has accumulated. The frequency of cleaning will depend on the local ambient conditions. For each detector, the cleaning, checking, operation, and sensitivity adjustment shall be attempted only after consulting the manufacturer's instructions.

(5) Tests Following an Alarm. Detectors shall be restored to service as promptly as possible after each test or alarm, and shall be kept in normal condition for operation. Devices requiring resetting or replacement shall be reset or replaced as promptly as possible after each test or alarm.

24.09: Acceptance

(1) Acceptance Test.

(a) Upon completion of the system, the installer, in the presence of the owner, shall test each self-restoring device for proper operation. He shall then instruct the owner on the operation and maintenance of the system.

(b) Upon completion of the installation, a satisfactory test of the fire detectors shall be made in the presence of the head of the fire department or his designee.

(c) All apparatus shall be restored to normal as promptly as possible after each alarm or test.

(2) General.

(a) Before requesting final approval of the installation by the head of the fire department, the installing contractor shall furnish a written statement to the effect that the detectors have been installed in accordance with the manufacturer's specifications.

(b) The installation of such devices shall be completed within six months of approval of plans or notification by the head of the fire department that such installation is required under M.G.L. c. 22, § 14; and M.G.L. c. 148, § 28.

REGULATORY AUTHORITY

527 CMR 24.00: M.G.L. c. 22, § 14; 148, §§ 10 and 28.